

# HYDROPONICS IN THE TOWN: FROM LITTLE COMMUNITIES TO THE LARGEST METROPOLISES

Berta Casanova Jiménez (Tutor Benet Gunsé)

## INTRODUCTION

### Hydroponics: Definition

Technology which allows the growing of plants into nutrient solutions, which are made of water and fertilizers. Plants can grow in a rooting medium, whether inorganic or organic. The roots in the mediumless systems are immersed directly in the aerated nutrient solution. The systems can be opened (no recovery of solution) or closed (recovery and replenishment).

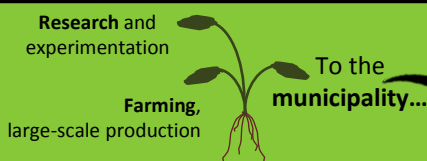
### Pros

- No use of soil, an important disease-carrying agent
- ↑ control of crop parameters
- +↑ control of fertilizers and pesticides applications
- ↓ use of fertilizers and pesticides
- Fast response of the crop to changes in nutrition parameters
- Water use and nutrient efficiency
- ↑ density crops
- No competence with opportunistic plants

### Cons

- ↑ initial investment
- ↑ maintenance costs
- Expert staff required in high production crops
- Fast response of the crop to changes in nutrition parameters
- ↑ risk of transmission of pathogen agents

## APPLICATIONS OF HYDROPONICS



1

### Green Covers

#### Characteristics and Benefits

- Heat insulating → energy saving
- Acoustic insulating → ↑ quality life
- Air filtering → ↓ pollution
- Aesthetics
- Possibility of cultivating edible plants

#### Vertical Covers

- Green façades (*outdoors*)
- Natural air conditioning (*indoors*)

#### Ground Covers

- Roof ground covers

Fig. 1. Scheme of a ground cover on a roof.  
Author: Berta Casanova



2

### Urban Horticulture

- Hydroponics at home
- ↓ space than traditional horticulture
- ↑ control of nutrients and crop parameters
- ↓ use of pesticides and fertilizers → possibility to produce own organic food
- Aesthetic articles

Fig. 2. Backyard Hydroponical culture structure. Extracted from  
<https://www.flickr.com/photos/cloudforest/4579807687/in/gallery-56416386@ND3-72157629130238693/>



3

### Farmscraper

#### Surface

- Farming indoors, on building stories
- No use of agricultural land

#### Food

- Great production in little surface of soil
- +↑ food security

#### Water

- Rain water use → no use of municipal water supply
- Might be wastewater treatment plant

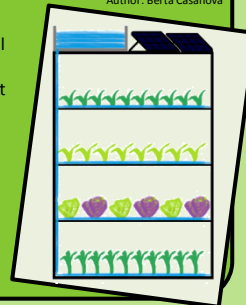
#### Sustainability - self-sufficiency

- Energy from solar panels and organic waste biofuels

#### Location

- Integrated in the city →  
↓ transport & ↓ contamination,  
↓ need for warehouses,  
+↑ freshness of food

Fig. 3. Scheme of a farmscraper, with rainwater collector and solar panels.  
Author: Berta Casanova

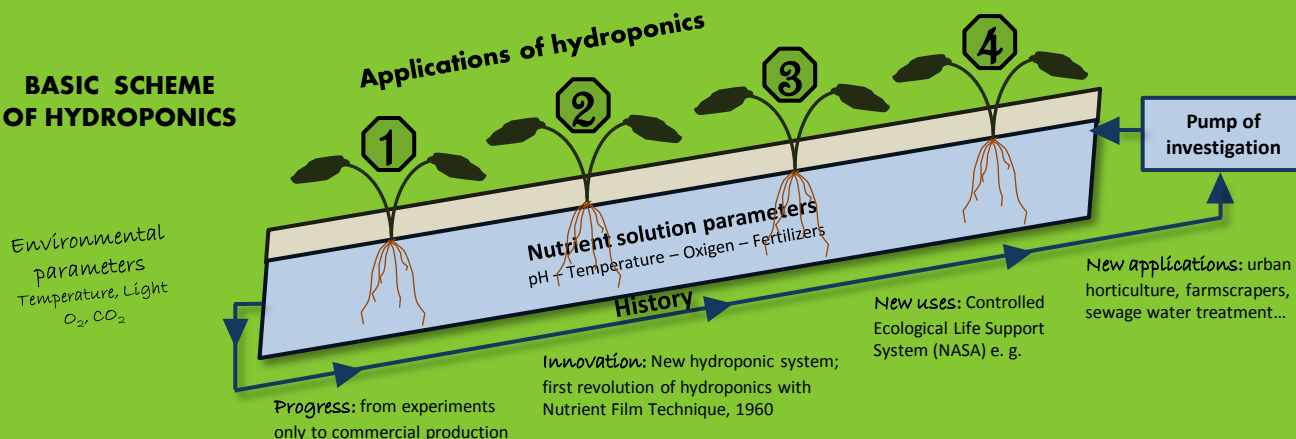


4

### Sewage Water Treatment

- Sewage water treatment  
+ Production of marketable (make edible) biomass
- Reduction of OM, P, S, N, DBO, DQO } Small communities usually
- Reduction of metals
- Roots → support for nitrifying bacteria & microorganisms
- Still experimentation needed

## BASIC SCHEME OF HYDROPONICS



## STATE OF THE ART

- Hydroponics has experienced a great evolution. New uses are appearing to satisfy more and more needs.
- The applications to the municipality are increasing in number and are appearing in more and more buildings. Vertical Farming is the most recent and versatile example of application of hydroponics.
- More investigation is needed to improve the hydroponic techniques. In fact, it is already making them more and more profitable, but it is still too expensive for many farmers to convert a traditional cultivation into a hydroponics